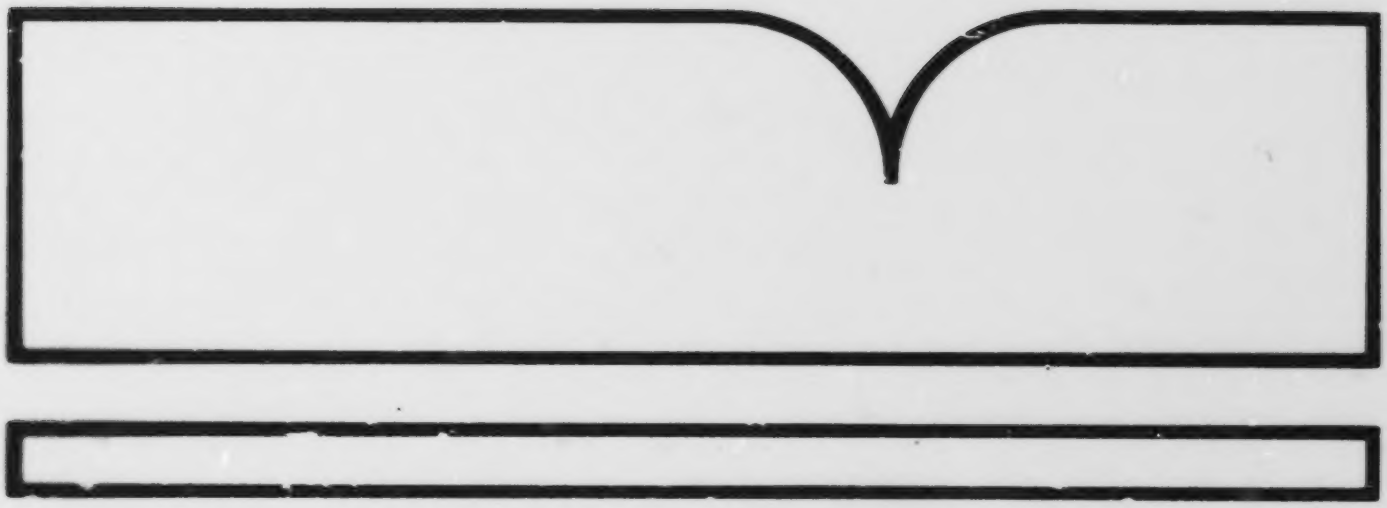
PB90-261587

Carbofuran: Position Document 2/3. Notice of Preliminary Determination

(U.S.) Environmental Protection Agency, Washington, DC

Jan 89



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16. Abstract (Limit: 200 words)

This Position Document addresses the risks and benefits of pesticide products containing the subject active ingredient. The Agency has determined that the use of products containing the subject active ingredient may meet or exceed a risk criterion described in 40 CFR Part 154. Potential hazards will be examined further to determine the nature and extent of the risk, and considering the benefits of the subject active ingredient, whether such risks cause unreasonable adverse effects on the environment.

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ENVIRONMENTAL PROTECTION AGENCY

OFFICE OF PESTICIDES AND TOXIC SUBSTANCES

[OPP-30000/48A; FRL]

NOTICE OF PRELIMINARY DETERMINATION TO CANCEL REGISTRATIONS OF CARBOFURAN PRODUCTS; NOTICE OF AVAILABILITY OF TECHNICAL SUPPORT DOCUMENT AND DRAFT NOTICE OF INTENT TO CANCEL

AGENCY: Environmental Protection Agency (EPA).

ACTION: Notice of Preliminary Determination.

SUMMARY: This Notice sets forth EPA's preliminary determination regarding the continued registration of pesticide products containing granular carbofuran and sets forth the Agency's assessment of the risks and benefits associated with the pesticidal uses of granular carbofuran. This Notice announces the Agency's preliminary determination to cancel all registrations of granular carbofuran. In addition, this Notice announces the availability of the Carbofuran Special Review Technical Support Document and the Draft Notice of Intent to Cancel. The Technical Support Document and accompanying scientific reviews constitute the technical documents in support of the action.

87P-1006

DATE: Written comments must be received on or before (insert date 60 days after date of publication in the FEDERAL REGISTER).

ADDRESS: Submit three copies of written comments, bearing the document control number "OPP-30000/48A" by mail to:

Public Docket and Freedom of Information Section,
Field Operations Division (TS-767C),
Office of Pesticide Programs,
Environmental Protection Agency,
401 M St., SW.,
Washington, DC 20460

In person bring comments to:

Rm. 236, CM #2,
1921 Jefferson Davis Highway,
Arlington, VA.

Information submitted in any comment concerning this Notice may be claimed confidential by marking any part or all of that information as "Confidential Business Information" (CBI). Information so marked will not be disclosed except in accordance with procedures set forth in 40 CFR Part 2. A copy of the comment that does not contain CBI must be submitted for inclusion in the public record. Information not marked CBI may be publicly disclosed by EPA without prior notice to the submitter. The carbofuran public docket, which contains all non-CBI written comments and the correspondence index, will be

available for public inspection and copying in Rm. 236 at the Virginia address given above, from 8 a.m. to 4 p.m., Monday through Friday, excluding legal holidays.

FOR FURTHER INFORMATION CONTACT: By mail:

Jay Ellenberger,
Special Review Branch,
Registration Division (TS-767C),
Office of Pesticide Programs,
401 M St., SW.,
Washington, DC 20460.

Office location and telephone number:

Rm. 1006, CM #2,
1921 Jefferson Davis Highway,
Arlington, VA 22202,
(703-557-7400).

Copies of the Carbofuran Technical Support Document and draft Notice of Intent to Cancel are available from the contact person at the address given above.

SUPPLEMENTARY INFORMATION: This Notice is organized into six units. Unit I is the Introduction and provides background information related to carbofuran and the initiation of the Special Review of all granular products. The availability of the Technical Support Document and the draft Notice of Intent to cancel are also discussed. Unit II provides discussion of the legal background. Unit III summarizes the avian risk assessment, the benefits assessment, and the

risk/benefit analysis. Information related to the hazard to humans from all formulations of carbofuran and its alternatives is also provided. Procedures related to the referral to the U.S. Department of Agriculture and the Scientific Advisory Panel are discussed in Unit IV. This Notice concludes with Units V and VI summarizing the opportunity for public comment and the availability of the public docket, respectively.

I. INTRODUCTION

Carbofuran is the common name for 2,3-dihydro-2,2-dimethyl-7-benzofuranyl methylcarbamate. FMC Corporation is the major producer and holds 11 registrations. FMC formulates carbofuran as a 2, 3, 5, 10, and 15 percent active ingredient (ai) granular product. These products include Furadan® 2G, 3G, 5G, 10G, and 15G. FMC also markets a 4 pound ai per gallon flowable formulation, a 75 percent wettable powder; and 75, 85, and 90 percent ai formulation intermediates. At present, the technical formulation is not federally registered. All granular carbofuran products marketed in the United States have been classified for restricted use based on the risk to avian species.

On September 30, 1985, EPA issued a Notice which initiated the Special Review of all granular products containing carbofuran, and which detailed the bases for the Agency's decision. (This document is also referred to as Position Document 1 or

PD 1, 50 FR 41938). EPA determined that granular carbofuran products met or exceeded the risk criterion existing at that time for acute avian toxicity described in 40 CFR 162.11(a)(3)(i)(B)(2). This criterion provided that a Special Review shall be conducted if a pesticide "occurs as a residue immediately following application in or on the feed of an avian species, representative of the species likely to be exposed to such feed in amounts equivalent to the average daily intake of such representative species, at levels equal to or greater than the subacute dietary LC_{50} measured in avian test animals as specified in the Registration Guidelines."

The EPA also determined that granular carbofuran met or exceeded the risk criterion existing at that time for population effects described in 40 CFR 162.11(a)(3)(ii)(C). This criterion provided that a Special Review shall be conducted if the use of a pesticide "can reasonably be anticipated to result in significant local, regional, or national population reductions in nontarget organisms, or fatality to members of endangered species."

At that time, the Agency had proposed new criteria for initiating a Special Review on a specific pesticide, which would consider a pesticide for Special Review when its use results in "residues of the pesticide product or its ingredients, impurities, metabolites, or other degradation products in the environment of nontarget organisms at levels which equal or

exceed concentrations acutely or chronically toxic to such organisms...." Available laboratory and field data indicated that granular formulations of carbofuran met or exceeded this proposed criterion. This risk criterion is now in effect and supercedes the old risk criteria. In either case the Agency determined that carbofuran met or exceeded the Special Review criteria, and the Agency would have initiated a Special Review regardless of which criterion was in effect.

Based on information received in public comments and on additional analyses performed since the Special Review process began, EPA has made a preliminary determination to propose cancellation of registrations of granular products containing carbofuran. EPA's position and a summary of the rationale underlying that position are set forth in this Notice. The basis for EPA's action is explained more fully in the Carbofuran Special Review Technical Support Document. Copies of the Technical Support Document are available upon request from the contact person listed at the beginning of this Notice. The Technical Support Document also contains references, background information, and other information pertinent to the registration of pesticide products containing granular carbofuran.

In addition, copies of a draft Notice of Intent to Cancel granular carbofuran products are also available from the

contact person listed above. Preparation of the draft Notice of Intent to Cancel is required by 40 CFR 154.31(b)(1). This draft Notice is being forwarded to the Scientific Advisory Panel (SAP) and the Secretary of Agriculture to permit their review of the Agency's action. The draft Notice of Intent to Cancel, along with the Carbofuran Technical Support Document and other notices and analyses prepared pursuant to 40 CFR 154.31, will be sent to all registrants and applicants for registration of pesticide products containing granular carbofuran. The draft Notice of Intent to Cancel is not now legally effective but is intended only to provide a basis for comment by the SAP, U.S. Department of Agriculture, registrants, and the public. The draft Notice indicates that registrants or distributors will not be allowed to sell and distribute existing stocks of cancelled products. Also, EPA will not allow the use of such existing stocks. The draft Notice also discusses requesting a cancellation or denial hearing after issuance of a final notice of intent to cancel. Comments on the draft Notice of Intent to Cancel, this Notice, and the Technical Support Document must be filed within 60 days of the issuance of this Notice.

II. LEGAL BACKGROUND

A. THE STATUTE

A pesticide product may be sold or distributed in the United States only if it is registered or exempt from registration

under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) as amended (7 U.S.C. 136 et seq.). Before a product can be registered unconditionally it must be shown that it can be used without "unreasonable adverse effects on the environment" (FIFRA section 3(c)(5)), that is, without causing "any unreasonable risk to man or the environment, taking into account the economic, social, and environmental costs and benefits of the use of the pesticide" (FIFRA section 2 (bb)). The burden of proving that a pesticide meets this standard for registration is, at all times, on the proponent of initial or continued registration. If at any time the Agency determines that a pesticide no longer meets this standard for registration, then the Administrator may cancel this registration under section 6 of FIFRA.

B. THE SPECIAL REVIEW PROCESS

The Special Review process, formerly called the Rebuttable Presumption Against Registration (RPAR), is a mechanism by which the Agency collects information on the risks and benefits associated with the uses of pesticides to determine whether any use causes unreasonable adverse effects to human health or the environment. The Special Review process is currently governed by 40 CFR Part 154.

Through the Special Review process the Agency (1) announces and describes the Agency's risk concerns regarding pesticidal use based on certain risk criteria; (2) establishes a public

docket; (3) proposes a regulatory decision; (4) solicits comments from the public on the proposed decision and issues concerning the Special Review; (5) responds to significant comments from the Secretary of Agriculture and the SAP; and (6) makes a final regulatory decision based on a balancing of risks and benefits associated with a pesticide's use.

Issuance of this Notice means that the Agency has assessed the potential adverse effects and benefits associated with the use of pesticide products containing granular carbofuran and that the Agency has preliminarily determined that, unless the terms and conditions of registration are modified as proposed in this Notice, the risks from granular carbofuran outweigh the benefits of its continued use.

C. OTHER STATUTES

In considering this action under FIFRA, EPA is mindful of other statues intended to protect birds. The Migratory Bird Treaty Act (MBTA) prohibits the taking, except by permit, of individual migratory birds (16 U.S.C. §703). Regulations promulgated pursuant to the MBTA list the migratory birds which are protected by the Act (50 C/F/R/ §10.13). The MBTA prohibits unpermitted taking "by any means or in any manner" of the protected bird species. Case law holds that even unintentional kills of birds by pesticide poisoning is prohibited by the MBTA. More than 20 species of birds protected by the MBTA have been reported killed by carbofuran. Indeed, in one incident, a carbofuran manufacturer was convicted of violating the MBTA for causing the deaths of a

number of birds exposed to a wastewater pond containing carbofuran.

A similar provision in the Bald and Golden Eagle Protection Act (BGEPA) prohibits takings of bald and golden eagles (16 U.S.C. §668). The Endangered Species Act (ESA) prohibits takings of species designated by the Department of Interior as endangered or threatened (16 U.S.C. §1538(c)). A number of bald eagle kills due to carbofuran have been reported and the Fish and Wildlife Service has determined that the continued survival of several endangered species is threatened by carbofuran use (see ~~section~~ Unit II of this document). Taken together, the provisions of these three statutes prohibiting unpermitted bird kills underline society's concern with needless destruction of wildlife and provide additional support for EPA's proposed action on carbofuran.

III. SUMMARY OF RISK AND BENEFIT DETERMINATIONS AND PROPOSED REGULATORY ACTIONS

A. RISK CONCERNS

To evaluate the hazard to birds from granular carbofuran in this Technical Support Document, the Agency evaluated the risk to birds based on (1) laboratory data on acute avian toxicity; (2) exposure; (3) estimated risk (4) field studies; (5) bird kill incidents; (6) population effects; and (7) toxicity and risks of the alternatives.

Based on laboratory data, the Agency concluded that carbofuran is acutely toxic to birds, and that a single granule may kill a small bird. Based on an analysis of

whether birds would be present when carbofuran is applied, the Agency determined that birds, including endangered species, are expected to be present at the time of application. Field and agricultural engineering studies confirm that at-planting application of granular pesticides, including carbofuran, results in granules exposed on the soil surface. Dietary exposure occurs from direct ingestion of granules and contaminated soil invertebrates such as earthworms. Predatory birds may be secondarily exposed to carbofuran by feeding on contaminated vertebrates such as small birds. Residues in wildlife confirm that both direct and secondary poisonings from carbofuran have occurred.

The Agency has described avian risk from granular carbofuran by comparing avian acute toxicity data (number of granules equal to an LD_{50} dose) to exposure (number of granules exposed per unit area). This ratio indicates that all registered uses of granular carbofuran pose a high risk to birds for acute toxicity. Field studies confirm the Agency's conclusion that bird mortality is expected when the expected amount of carbofuran granules are available for avian consumption.

The Agency assessed 6 field studies conducted at 11 locations that investigated the loss of birds from label-directed, soil-incorporated uses of 10G and 15G applied as band and in-furrow applications and 10G using specialized equipment. Commonly practiced techniques for soil incorporation of granules were used. Application of 1 and 4 lb ai/A resulted

in approximately the same level of avian mortality. Both direct and secondary poisoning occurred. The Agency concluded that bird mortality following the label-directed use of granular carbofuran may be a frequent and regular occurrence. Furthermore, 'the magnitude of the acute mortalities could be more heavily influenced by the numbers of birds entering treated fields, than by the extent of incorporation of granules or application rate.

Bird kill incidents from direct carbofuran poisoning have occurred in several crops in various areas of the country and Canada. The types of birds varied and included both migratory and nonmigratory birds. Bird mortality was frequently associated with at-planting application, but has occurred with other uses at other times of the year. Direct poisoning of birds has caused over 40 separate, reported bird kill incidents involving one to over 2,000 birds. More than half of these reported incidents are associated with carbofuran's use on rice.

Secondary poisoning incidents have also occurred and involved bald eagles, red-tailed hawks, red-shouldered hawks, northern harriers (marsh hawks), and other birds of prey. Such species are attracted to dead and dying smaller birds and small mammals affected by granular carbofuran.

Birds of prey species commonly produce only a few young per year and are slow to reach sexual maturity. Thus, the death of each individual of these species can have important

consequences for a population. A computer model of a small breeding population of bald eagles that had experienced several mortalities due to granular carbofuran was used to illustrate this point. If the rate of carbofuran-related mortality observed in this population remains constant, the model predicted that the small breeding population will remain static over a 10-year span, even under ideal breeding conditions. At secondary mortality rates slightly higher than those observed in this population, the model predicted that the breeding numbers could decrease over the short span of the model.

The Agency believes that direct and secondary bird kill incidents that have been reported underestimate the number of incidents actually taking place because of the problems associated with the reporting of bird kills and with carcass removal by predators.

Populations of declining or endangered species may be present in areas where carbofuran is applied. The Agency cited documented population declines of the red-shouldered hawk, loggerhead shrike, field sparrow, Henslow's sparrow, and others. Statistically significant declines have been measured for several species.

While the Agency does not consider granular carbofuran to be the sole causative factor in the decline of the bird species discussed, carbofuran is one of the most highly toxic pesticides to which these birds are exposed. Given its widespread use in agriculture, carbofuran is likely to be responsible for

bird deaths in these species. The Agency concluded that granular carbofuran can, therefore, be an important additive factor in the declines.

The Division of Endangered Species and Habitat Conservation (DESHC) of the Fish and Wildlife Service indicated in the Biological Opinion dated July 2, 1987, for carbofuran, that the Aplomado falcon, Attwater's greater prairie-chicken, and Aleutian Canada goose were the bird species jeopardized by the use of carbofuran. To avoid jeopardy to these species, DESHC indicated that the use of carbofuran should be eliminated in certain areas. The use of carbofuran in certain areas is already prohibited to protect the Attwater's greater-prairie chicken, Aleutian Canada goose, and Kern primrose sphinx moth. DESHC also indicated that the bald eagle, whooping crane, and Mississippi sandhill crane may be adversely affected. DESHC recommended prohibiting the use of carbofuran in certain areas.

The Agency compared the risks of granular carbofuran to representative avian species to the risks posed by its alternatives. Since the greatest risk of granular pesticides to avian wildlife may result from direct exposure, especially ingestion, the Agency compared the acute toxicity (in terms of the number of granules equivalent to an LD_{50} dose) to estimates of exposure (in terms of the number of granules exposed and available to birds per unit area) for carbofuran and its alternatives. This comparison is expressed as the ~~the~~ number of LD_{50}s/square foot of treated ground. Based on this analysis it appears that carbofuran generally poses a a greater risk to birds than the alternatives.

B. ADDITIONAL CONSIDERATIONS

The Agency evaluated information concerning the hazard to humans from carbofuran and its major alternatives. Based on the available data, carbofuran does not appear to pose a chronic human health hazard because it has not shown positive oncogenic, teratogenic, or reproductive effects. Existing data indicate no adverse chronic health effects associated with the alternatives although the data bases are incomplete for many effects so definitive conclusions cannot be drawn. The Agency has required additional studies to complete the data bases. Based on data on acute health effects, the acute oral hazard of carbofuran is the same order of magnitude as fonophos, phorate, and terbufos, but is less than aldicarb, and greater than the other alternatives examined.

The Agency also evaluated the potential for ground water contamination from carbofuran. The environmental fate data indicate that carbofuran is highly mobile and has a potential to leach. Simulation modeling with the Pesticide Root Zone Model support this hypothesis. The environmental fate data indicate that under low pH and low temperature, residues of carbofuran could persist after leaching into the ground water. Since these conditions are not widespread in the United States, most leaching of carbofuran will probably not result in significant concentrations at the wellhead. Ground water conditions of low pH and low temperature generally exist in the Northeast, where monitoring data indicate that New York, Massachusetts, and Maryland show the highest and most frequently

found residues in ground water. The highest level found was 71 parts per billion and was found in a well near corn and potato fields in Maryland. Other studies suggest that carbofuran may also be found in surface waters that may be used for drinking water. The Agency will require registrants to amend their labels' current ground water advisory statement in an effort to further reduce the potential of ground water contamination from carbofuran use.

C. DETERMINATION OF BENEFITS

The Agency's benefit analysis examined in depth the following use sites: field corn, sorghum, soybeans, rice, peanuts, tobacco, cotton, cranberries, pineseed orchards, and sunflowers. The Agency reviewed the pests associated with these crops, methods of application, agricultural practices, and chemical and nonchemical alternatives. In the Technical Support Document, the Agency also sought to identify newly emerging integrated pest management (IPM) strategies that may have an impact on the future benefit of carbofuran use. While the potential impacts of these strategies on the quantitative benefits estimates were not calculated, EPA notes that they do present potential alternative agricultural practices.

Approximately 7 to 10 million pounds of active ingredient (lb ai) of all carbofuran formulations are used on a variety of agricultural crops and forestry sites per year, with approximately

6 to 9 million lb ai of the annual usage accounted for by the granular formulations. About 68 percent of all carbofuran use is on corn, 14 percent on sorghum, 5 percent on soybeans, 2 percent on rice, 5 percent on peanuts, and 2 percent on tobacco. Also, less than 1 percent is used on each of the following sites: cotton, cranberries, sunflowers, and pineseed orchards. These uses encompass over 95 percent of the granular carbofuran usage and about 85 percent of all carbofuran formulation usage.

If carbofuran is not available for treatment of the 10 sites, the Agency estimated an annual grower impact that ranged from approximately $22.8 to $33.0 million. The largest economic impact from cancellation of granular carbofuran would be for rice since no registered alternatives are available for control of the rice water weevil. The Agency estimates that the grower impact would be $12.2 million annually; a $6.1 million decrease in Federal deficiency payments to rice growers would indicate a net loss to society of $6.1 million.

Corn is the major use site for carbofuran, and cost-effective, efficacious alternatives are available. No changes in costs of production, yields, or revenues would be expected. The corn insecticide market is highly competitive, and viable alternatives with similar pesticide performance would be available at comparable cost per acre.

The carbofuran market for field corn has been declining since 1978. Current usage is approximately one-third the level it was in 1978. Carbofuran has lost its market share primarily

to terbufos and chlorpyrifos. By 1986, the market share held by carbofuran dropped to less than 15 percent. In terms of acre treatments, it ranked fourth out of the five major corn insecticides. The reasons for the decline are not clear, but could include loss of effectiveness, spectrum of control, and others.

Carbofuran is applied to an estimated 185 acres of nonflooded cranberries in Washington and Oregon to control the black vine weevil larval stage. Because of the soil or the terrain of the fields, these cranberry acres are not diked for flooding. Flooding can be a cultural method for controlling the weevil. Carbofuran is the only insecticide registered for control of the larval stage while acephate is registered for the control of the adult stage of this pest. The impact on cranberries, excluding acephate, is expected to occur over a 7-year period due to the perennial nature of the crop. Overall impacts could be approximately $7 million to $7.7 million over the 7 years or $1.0 to $1.1 million annually.

For the U.S. sorghum industry, cancellation would generally not have an adverse effect on the overall sorghum industry (at most $0.4 to $0.9 million annually) or consumers. In years of high chinch bug infestations, which occur every 5 to 10 years, annual localized income reductions could range from $7.4 to $9.3 million in eastern Kansas if aldicarb is used as an at-planting alternative. However, this estimate of impact does not consider the foliar treatments that would be available for use when infestations actually occur. Foliar treatments may not always provide adequate control because of problems

with treatment timing, limited availability of scouts, and chinch bug reinfestations.

For the remaining crops, the Agency does not anticipate major impacts. The overall economic impact from cancellation is not expected to result in significant changes in either production costs or outputs.

The Agency also evaluated aspects of carbofuran use that are not easily quantifiable. For example, only one carbamate (trimethacarb) would be available for corn growers who rotate organophosphate and carbamate insecticides to delay development of resistance in soil pests. The Agency recognizes that some cross-resistance with organophosphates could occur because both affect acetylcholinesterase. Also, carbofuran has residual and systemic properties and a broad spectrum of control. It should be noted that repeated use of carbofuran may lead to an apparent increase in soil microbial populations that are capable of reducing its effectiveness.

D. RISK/BENEFIT ANALYSIS

There are three basic options for regulating the uses of carbofuran:

Option 1 - Continuation of registration without changes,

Option 2 - Continuation of registrations with modifications to the terms and conditions of registration, and

Option 3 - Cancellation of registration.

Adoption of Option 1 would be appropriate only when the Agency has concluded that the level of risk is acceptable compared to the benefits of use and that further risk reduction measures

are not necessary to assure that the use of the pesticide meets the statutory standard for continued registration. Adoption of Option 3 would be appropriate when the Agency has concluded that the risks from a use outweigh the benefits of that use and that the risks cannot be mitigated to an acceptable level when compared to the benefits by any measures short of cancellation.

Option 2 is appropriate when the risks of a pesticide's use can be reduced to a level where the benefits of use outweigh the risks. This risk reduction is accomplished by modifying the terms and conditions of the pesticide's registration. EPA has considered various modifications for regulating the uses of carbofuran; these modification are evaluated fully in the Technical Support Document and are summarized here.

1. Adding label precautionary statements. The Agency considered requiring additional precautionary labeling regarding the hazard to birds from the use of carbofuran. However, the additional labeling would not significantly mitigate the hazard to birds. Carbofuran is already a restricted use pesticide on the basis of the avian hazard and limited in use only to certified applicators or persons under their direct supervision. Extensive environmental hazard warning statements already appear on the label and, despite such label statements, bird kill incidents still have occurred.

2. Limiting application to certain months. The Agency considered limiting carbofuran application to certain months because most of the bird kill incidents occurred during the major use season from April to June. Eliminating the use of

carbofuran during any particular season of the year would eliminate the bird kills in direct proportion to use. Carbofuran must be applied during a certain season to be effective, and eliminating its use at that time of year would essentially result in cancellation.

3. Limiting application to certain geographic areas. Because most of the bird kill incidents involved waterfowl, the Agency considered limiting carbofuran application to areas outside those that constitute the major waterfowl migration flyways. By not allowing carbofuran application in those areas, the risk to these migrating waterfowl and birds within the flyway could be reduced. However, eliminating the use of carbofuran in the flyways would also affect a large portion of the usage of carbofuran. In addition, exact boundaries of these flyways cannot be readily defined.

4. FMC Corporation's risk reduction program. FMC Corporation, the major registrant of carbofuran, proposed a risk reduction program that included several measures to reduce the avian hazard. The major points of FMC Corporation's program are as follows:

a. Reduce percent ai. Voluntarily remove carbofuran 15G from the market, but retain the Federal registration. Carbofuran 10G would remain as the formulation with the highest percent ai until FMC has demonstrated that the avian hazard from 15G is at an acceptable level.

b. Reduce application rate in corn. Reduce maximum application rate for corn from 4 to 1 lb ai/A based on a 40-inch row space.

c. Substitute "T" band for band application. "T" band is an application method combining band and in-furrow application. When using in-furrow application, granules are dropped into the furrow and covered with soil. When using band application, granules are applied as a 7-inch band on the soil surface and are then incorporated into the soil. "T" band application is a modified form of band application, which may leave as little as a 4-inch band, depending on the application equipment.

d. Conduct research. Begin studies to determine if changes such as modifying the release rate or size, shape, and color of granule could further reduce risk.

e. Aid equipment research. Aid research on new farm equipment which would result in greater incorporation of granules and subsidize growers for the purchase of new equipment if it is developed.

f. Implement educational program. Implement an educational program to educate growers on the proper use of carbofuran to reduce avian hazard.

g. Provide funding for endangered species. Provide $1,500,000 over the next 5 years for endangered species relocation and/or to purchase or preserve critical habitat.

5. Agency's analysis of FMC's program. The Agency evaluated each point of FMC's program, as discussed below.

a. Reduce the percent ai. Such a reduction would temporarily eliminate the hazard from 15G. However, the

documented hazard from 10G would still remain. Also, application of 10G results in approximately 50 percent more granules than from 15G. A single granule of 10G can be lethal to small birds.

b. Reduce application rate in corn. Assuming the typical 35-inch row space, rate reduction from 4 to 1 lb ai/A would result in a maximum of 72 percent fewer granules applied. Although this would reduce the number of granules applied, field studies indicate that application of 1 lb ai/A would still pose a high risks to birds.

c. Substitute "T" band application. Based on studies with band and in-furrow application, estimates indicate that a 4-inch "T" band would result in 43 percent fewer granules remaining unincorporated than would occur with a 7-inch band application.

While "T" banding may reduce the number of granules exposed on the soil surface, it would not be expected to result in a proportional reduction in avian mortalities. Birds were killed in field studies using band application at 4 and 1 lb ai/A and in-furrow application at 1 lb ai/A. Because "T" band application would be expected to result in a number of granules exposed on the soil surface between the numbers resulting from in-furrow application at 1 lb ai/A and at 4 lb ai/A, "T" banding is expected to result in mortalities within the range of mortalities observed in these field studies.

d. Conduct research and aid in research. Research regarding reformulation of granular carbofuran products and developing new farm equipment has the potential to result in a formulation less attractive to birds and may result in fewer unincorporated granules. However, the Agency does not know if risk reduction would occur, and if so, to what extent.

e. Implement educational program. Educating users in the proper application of carbofuran would result in greater assurance of compliance with risk reduction measures and would probably help to ensure that carbofuran is applied properly. However, field studies and bird kill incident data indicate that proper application of carbofuran results in birds being killed.

f. Provide endangered species funding and relocation. In limited situations such as with dicofol, the OES has accepted funding and relocation as a way to offset the impact to endangered species.

However, the Aplomado Falcon has already been relocated from Mexico into Texas as an attempt to reintroduce it into its historic range, which happens to be an area of carbofuran use.

6. The Agency's risk reduction program and analysis. The Agency explored whether a modified risk reduction program developed by FMC Corporation would result in sufficient risk reduction. The major points analyzed by the Agency are as follows:

a. Cancellation of 15G. As opposed to temporarily removing 15G from the market, 15G would be cancelled. 10G would remain as the formulation with the highest percent ai.

b. Reduce application rate in all crops. In addition to requiring FMC's rate reduction for corn, rate reduction would be required on other crops as well.

c. Requiring in-furrow application only. In-furrow application would remain as the only registered application method for carbofuran.

As discussed under FMC's program, eliminating 15G would remove the hazard from 15G. The 10G formulation would be applied using in-furrow application, which results in the greatest degree of soil incorporation of all the carbofuran application methods.

However, the documented hazard from 10G would remain. Although fewer granules would be applied by using the 10G formulation in combination with rate reduction and in-furrow application, field studies indicate that rate reduction to 1 lb ai/A and in-furrow application may well result in mortality levels comparable to those resulting from banded application at higher rates. Also, a 1 lb ai/A limit for other crops may not be efficacious.

7. Comparison of the two programs. The two risk reduction programs were initially compared by calculating exposure reduction in terms of the number of granules remaining unincorporated on the surface of the soil and, therefore, available to birds.

The number of granules of 10G and 15G that are available to birds on the soil surface from carbofuran application are conservatively estimated as follows:

Current Application	Estimated Number of Granules Available to Birds Per Acre
10G, 4 lb ai/A, 7-inch band	2,648,000
15G, 4 lb ai/A, 7-inch band	1,768,000

If either risk reduction program were implemented, the number of granules available on the surface of the soil would decrease. Table 1 compares estimates of the number of granules that would be readily available to birds on the surface of treated fields:

Table 1 -- Estimates of the Number of Granules Available to Birds

Proposed Use Program	Number of Granules Per Acre	Change from Current Use Pattern
FMC Program		
15G - Voluntary suspension	---	---
10G, 4 lb ai/A, 7-inch band	2,648,000	+ 880,000
10G, 1 lb ai/A, 7-inch band	662,000	- 1,106,000
10G, 1 lb ai/A, 4-inch band	337,000	- 1,431,000
EPA Program		
15G - Suspension/cancellation	---	---
10G, 4 lb ai/A, 7-inch band	2,648,000	+ 880,000
10G, 1 lb ai/A, 7-inch band	662,000	- 1,106,000
10G, 1 lb ai/A, in-furrow	95,000	- 1,673,000

These estimates indicate that the number of exposed granules would be reduced. However, these estimates do not consider the number of granules available below the surface. Birds may consume below-surface granules while foraging for seeds, grit, or invertebrates. This is one reason why reducing the number of exposed granules would not be expected to result in a proportional reduction in avian risk.

The available field data do not indicate that the reduction in potential bird poisonings is proportional to the reduction of the number of granules. Although the field studies were performed at different application rates with different application methods, sites, and locales, avian mortality for direct carbofuran poisoning occurred in all studies and up to 60 days after application. Secondary poisoning occurred as well. The data indicate that the number of granules remaining would still result in approximately the same level of avian mortality as occurs following current application methods. As discussed earlier, one granule of either 10G or 15G is sufficient to kill a small bird. Therefore, risk reduction in the probability of birds consuming a single granule is necessary for substantial risk reduction to occur.

Field data are available for the following combinations of formulation and application methods:

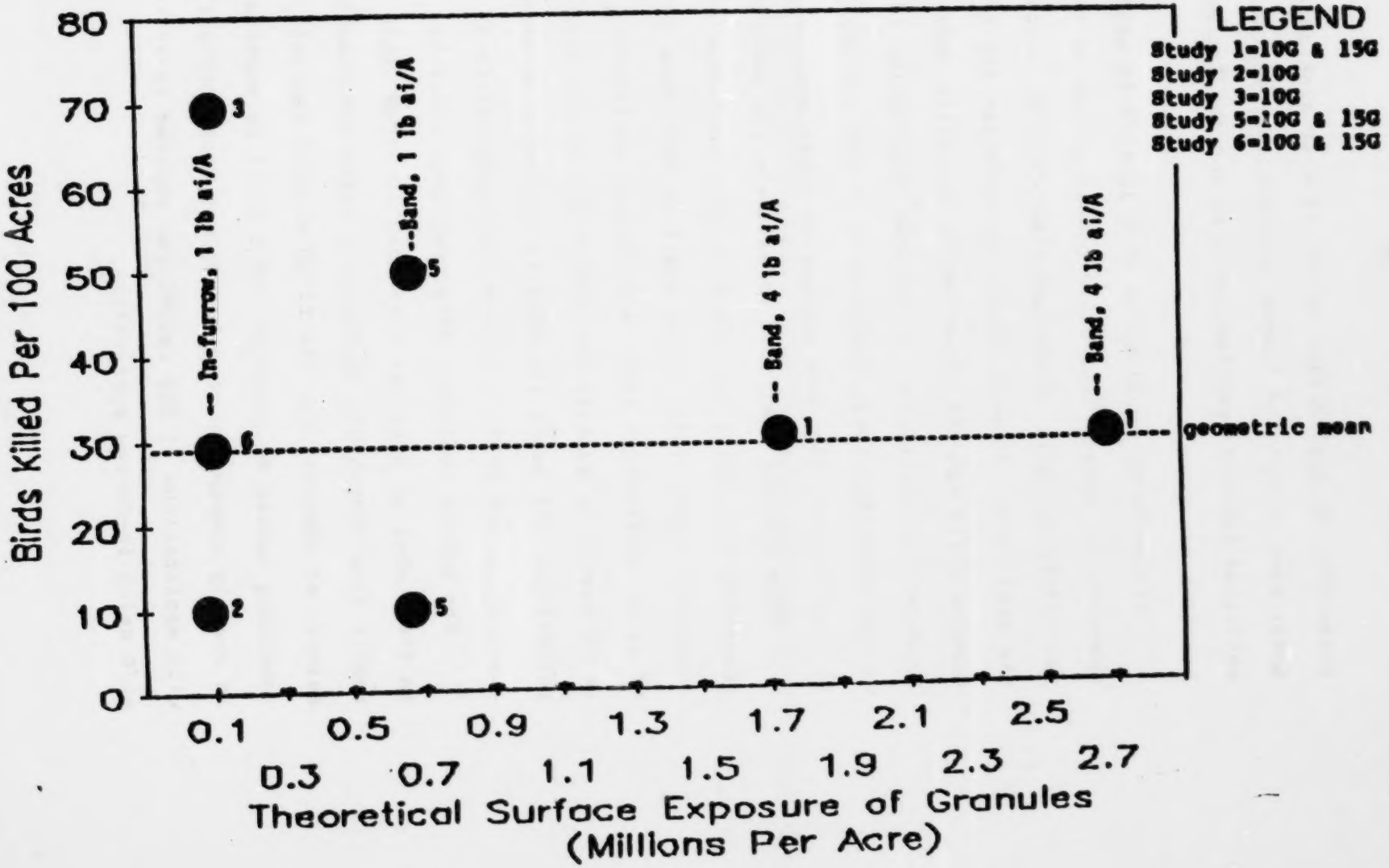
Formulation	Application
10G and 15G	7-inch band at 4 and 1 lb ai/A
10G and 15G	In-furrow at 1 lb ai/A
10G	Specialized equipment at 25 lb ai/A

These data are plotted in Figure 1. The estimated number of granules remaining unincorporated on the surface of fields is plotted against the number of birds killed per 100 acres of searched area. The resulting curve is not a regression, and a correlation coefficient was not calculated. The purpose of representing the studies in this way is to show a possible relationship between the exposure of granules on the soil surface and the rate of avian mortality. Since these data are essentially not statistically comparable, they may not be used to establish a quantifiable relationship. Figure 1 shows that the rate of bird poisonings is roughly constant within the data points available. In other words, application of 10G at 1 lb ai/A in-furrow resulted in roughly the same rate of

(continue)

Figure 1

RATES OF AVIAN MORTALITY OBSERVED DURING CARBOFURAN FIELD STUDIES.



poisonings as application of 10G at 4 lb ai/A using a 7-inch band, even though the former application resulted in an estimated 100,000 granules per acre and the latter 2.6 million granules per acre.

If in-furrow application at 1 lb ai/A is used, very few granules per square foot could remain on top of the soil (excluding spills). These granules would be concentrated in the seed rows. However, these few granules are of concern because field studies showed avian mortality under these application conditions. A possible explanation is that birds do not encounter these granules by chance but may be attracted to them because they are similar in appearance to grit.

Data are not available to estimate the potential bird poisoning rate below the 10G 1 lb ai/A in-furrow application scenario. Thus, while it is possible that some combination of lower application rates and changed application techniques could result in substantial reductions in the rate of bird poisonings, EPA lacks the data to determine an acceptable combination and whether or not that combination is efficacious.

The Agency therefore concluded that while net reductions in the number of granules available to birds would likely result from decreasing application rates and changing the methods of application, the field studies indicate that the remaining number of granules would still be expected to result in roughly comparable rates of direct avian mortality, even with applications of 10G carbofuran reduced to as low as 1 lb ai/A using in-furrow application.

E. RISK/BENEFIT ANALYSIS OF REGULATORY OPTIONS

The Agency has concluded that if the registrations of carbofuran products were continued without restriction (Option 1), the risks to birds resulting from carbofuran application would exceed the benefits associated with carbofuran use.

The Agency has evaluated amending the terms and conditions of registration (Option 2) by modifying labeling to include additional precautionary language, limiting application to certain geographic areas or certain months of the year, or by imposing risk reduction measures through various risk reduction programs. The Agency has determined that none of these measures would adequately reduce the risk to birds to bring the risks and benefits of carbofuran use into balance.

As a result the Agency considered cancellation (Option 3), which would eliminate the hazard to birds from carbofuran exposure from these sites. To evaluate cancellation, an in depth risk/benefit analysis on 10 sites of application was conducted.

The following crop-by-crop discussion notes whether there have been bird kills associated with field studies or incident reports linked to the application of carbofuran in a specific crop. Details pertaining to these kills are described in the Agency's Technical Support Document.

Exposure is often comparable among sites, and bird kills associated with one site strongly suggests that kills also will be associated with sites having similar exposure. When EPA lacks documentation of kills for a given site, this does not necessarily reflect a true absense of kills associated with the use of carbofuran at that site. Rather, the lack of systemic observations for that site and the lack of an effective system for reporting and verifying bird kills associated with pesticide use.

1. Corn. Species diversity and population levels are high in corn fields and may include endangered species such as the Aleutian Canada goose and Mississippi sandhill crane and other species such as waterfowl, marsh and shorebirds, upland game birds, and passerines. Researchers have documented birds using corn fields throughout the crop cycle for a range of activities, including feeding, resting, nesting, and brood-rearing. Since carbofuran may be applied both at-planting or postemergence, any of these activities may occur at the time of application.

Birds will mainly be exposed to carbofuran granules on the soil surface. Agricultural engineering and field studies confirm that application of granular pesticides, including carbofuran, applied at-planting results in granules exposed on the soil surface. This is of concern because data from acute toxicity testing indicate that one granule can provide a sufficient dose to kill some small birds.

The Agency estimated the number of LD_{50}s/sq ft for songbirds, upland gamebirds, and waterfowl based on current product label information, which resulted in a minimum of 6 and a maximum of 2211 LD_{50}s/sq ft. These estimates suggest that the use of granular carbofuran in corn poses a potential risk to birds. Field studies indicate that avian mortality occurred at estimated risk levels as low as 6 LD_{50}s/sq ft.

In addition to the bird mortality documented in the field studies, mortality has also been documented as reported bird kill incidents. Direct poisoning has resulted in killing waterfowl, songbirds, and other species from carbofuran application in several states. Secondary mortality to birds of prey such as hawks, bald eagles, and others has also occurred in the field studies and as secondary kill incident reports.

Because of its widespread use on corn, the Agency is concerned about the potential impact on populations of declining birds, which may be exposed by either direct or secondary poisoning. Population declines of the red-shouldered hawk, loggerhead shrike, and other birds of prey and small birds such as the field sparrow have been documented.

While the Agency does not consider granular carbofuran to be the sole causative factor in the decline of the bird species discussed, carbofuran is one of the most highly toxic pesticides to which these birds are exposed. Given its widespread use in corn, carbofuran is likely to be responsible for bird deaths in these species. The Agency concluded that

granular carbofuran can, therefore, be an important additive factor in the decline of these birds.

Carbofuran is applied as a preventive treatment when seeds are planted to 4.5 to 5.5 million acres of corn or 5 to 7 percent of the U.S. corn crop per year. Carbofuran is used primarily to control the corn rootworm and corn borer complexes. Usage has been declining and is approximately one third of the 1978 level. By 1986, the market share held by carbofuran dropped to less than 15 percent, where in terms of acre treatments, carbofuran ranked fourth out of the five major corn insecticides. These insecticides are terbufos, chlorpyrifos, fonofos, carbofuran, and phorate.

The Agency evaluated data that indicated that several efficacious alternatives such as terbufos and chlorpyrifos are available and are of comparable cost. Alternatives are available both for use at-planting, the most common method of application, and later in the season when pest problems actually occur. No difference in yield was demonstrated between carbofuran and its alternatives, and the economic impact of cancellation is negligible. Also, field data support the conclusion that carbofuran appears to pose a greater avian hazard than the alternatives.

Carbofuran has a broad spectrum of control and residual systemic properties, which makes it attractive to certain growers. Carbofuran is one of only two carbamate pesticides available for rotation between organophosphates and carbamates in corn to delay resistance in soil pests. The Agency recognizes

that some cross-resistance with organophosphates could occur because both affect acetylcholinesterase. It should be noted that repeated use of carbofuran may lead to an apparent increase in soil microbial populations capable of reducing its effectiveness.

Because less hazardous, efficacious alternatives of comparable cost are available, the Agency concluded that the risk to birds outweighs the minor benefits and proposes cancelling carbofuran use on corn.

2. Sorghum. Birds such as marsh and shorebirds, game birds, songbirds, and waterfowl are expected to be in sorghum fields at the time of carbofuran application. Endangered species that may be exposed include, the Attwater's greater prairie-chicken, Aplomado falcon, and the whooping crane. In one case, whooping cranes had to be driven away from a sorghum field treated with granular carbofuran.

The Agency estimated the number of LD_{50}s/sq ft for songbirds, upland game birds, and waterfowl. The estimated values ranged from 5 to 1033.

Bird kills are likely to occur in sorghum as sorghum fields at planting time are similar to corn fields at planting time.

Carbofuran is applied to approximately 640,000 to 2.04 million acres of sorghum or 4 to 12 percent of the acres

planted. It is primarily applied at-planting to control later infestations of chinch bug and greenbug.

For greenbug control, pesticides may be applied at-planting as a preventive treatment or later in the season if problems with greenbugs arise. Several alternatives are available, but terbufos is most likely to be used. In terms of product performance, terbufos appears to be equally effective.

Most years with normal pest infestations are not expected to have an adverse impact on growers. During years of high chinch bug infestations every 5 to 10 years, both localized cost increases and yield losses would be incurred with the use of aldicarb as an at-planting treatment. However, foliar treatments are available.

Sorghum has received considerable IPM attention. Due to the relatively low return on sorghum, a number of pest management and cultivation practices have already been incorporated into sorghum culture to reduce the need for pesticide application. None of these practices will completely replace the use of insecticides on sorghum, but they will help reduce the number of applications and the amount of insecticides used.

The Agency concluded that the risk to birds outweighs the minor benefits and therefore proposes to cancel the use of carbofuran on sorghum.

3. Soybeans. Birds that are expected to be present at application include waterfowl, marsh and shore birds, game species, and songbirds. Endangered species expected to be present at application include the bald eagle, whooping crane, and Mississippi crane.

The range of estimated LD_{50}s/sq ft for songbirds, upland gamebirds, and waterfowl are 6 to 2104, which are values that suggest that carbofuran poses a potential risk to birds.

The use pattern and thus the risk is similar to corn. A bird kill incident associated with corn and soybean fields was reported and involved 25 waterfowl, bluejays, grackles, and killdeer.

Carbofuran is applied to approximately 210,000 to 280,000 acres of soybeans or less than 1 percent of the U.S. soybean crop. It is used mainly to control the Mexican bean beetle. In the majority of the soybean-producing states, the Mexican bean beetle is not a major pest and is only of major concern in some of the southeastern states. Because carbofuran is applied at-planting, it is uncertain whether enough carbofuran will be present in the plant to control an infestation at pod set and fill, the critical stages of Mexican bean beetle infestation. Thus, consultants and extension entomologists in the majority of the soybean-producing states recommend the use of foliar sprays later in the season to control the Mexican bean beetle. The use of resistant varieties of soybeans, early planting, and crop rotation are also recommended.

Alternatives are available at-planting and as foliar sprays later in the season. Efficacy data indicate that viable alternatives, including disulfoton and terbufos, are available and are not expected to have adverse impacts on production costs. Overall, aggregate impacts are expected to be minor, amounting to less than 1 percent of the U.S. farm

value of soybeans.

The Agency proposes to cancel the use on soybeans because the hazard to birds outweighs the minor benefits.

4. Rice. Rice fields offer attractive habitat to many types of birds, including migratory waterfowl. Diverse water species are expected to be present when carbofuran is applied, and hawk species are known to search rice fields for prey.

EPA estimated the number of LD_{50}s/sq ft for songbirds, upland gamebirds, and waterfowl. These values range from 13 to 261 and suggest that carbofuran poses a potential risk to representative bird groups.

The 20 reported bird kill incidents which have occurred on rice corroborate the assertion that the use of carbofuran on rice poses a high risk to birds. These 20 incidents are over half of all reported bird kill incidents associated with carbofuran. These incidents include direct and secondary waterfowl kill incidents. The numbers of killed birds range from 1 to 150. A field study was conducted in rice, but a quantitative analysis could not be conducted due to lack of important information on the extent of the treatments and the performance of carcass searches.

Carbofuran is applied to approximately 319,000 acres in Arkansas, California, Louisiana, Mississippi, Texas, and Missouri, or about 10 percent of the U.S. rice acreage, to control the rice water weevil.

Carbofuran is the only pesticide registered to control the rice water weevil, a major pest of rice in all growing regions, and treatment varies among California and southern

rice-growing states. All control recommendations are based on annual population monitoring.

Since no alternative chemical controls are available, pest control costs would decrease by approximately $8.50 per acre or about 4 percent of the total variable operating costs in the Delta and 3 percent in California from cancellation of this use. Considering the savings from not applying carbofuran or any other pesticide, as well as the value of a 7 percent yield loss, the annual net revenue loss is approximately $12.2 million or 10 percent of the net farm income of the impacted acres. Some marginal rice growers who normally rely on carbofuran may be forced out of business.

Government payments under the current U.S. Department of Agriculture farm program would decrease by $6.1 million because of lower production. Subtracting the reduced government payments ($6.1 million) from the rice industry impact ($12.2 million) results in an estimate of the net loss to society of $6.1 million.

The Agency is unaware of any measures which would reduce the hazard from carbofuran use on this site. Because of risks, as exemplified by the number of reported bird kill incidents in rice, the risks outweigh the benefits on this site. As a result, the Agency proposes to cancel this use.

However, EPA recognizes that there are no chemical alternatives currently registered for use to control the rice water weevil and only limited information pertaining to the availability and efficacy of non-chemical alternatives. Thus the substantial risks associated with carbofuran's use must be weighed against

the substantial benefits. Because the Agency is concerned about the lack of chemical alternatives for control of the rice water weevil, as well as the risks associated with carbofuran's use, the Agency requests comments on the following issues:

(1) the extent of usage of carbofuran to control the rice water weevil;

(2) the economic impacts that would result from cancellation of carbofuran's use on rice;

(3) the potential for other pesticides being registered to control the rice water weevil, particularly efficacy testing of such pesticides;

(4) the potential for non-chemical control methods, including draining of fields and biological control organisms, to control the rice water weevil (particularly efficacy testing of such methods); and,

(5) the availability of bird kill information on rice fields outside of California, and any information which would assist the Agency in interpreting the apparently extensive bird kills particular to that state.

5. Peanuts. An endangered species, the Attwater's greater prairie chicken, along with upland game and songbird species are expected to be present at application. Field studies were not available, and no bird kill incidents were reported. The estimated LD_{50}s/sqs ft for songbirds, upland gamebirds, and waterfowl ranged from 3 to 2632.

Approximately 136,500 acres of peanuts or 9 percent of the total crop are treated with carbofuran to control insects and nematodes. Efficacious alternatives are available for both uses. The generally higher rate of application for

nematode control leads to higher treatment costs, particularly if aldicarb or fenamiphos are used. The overall annual change in insect and nematode control costs if carbofuran were not available would not exceed $4.0 million. The total variable costs of peanut production would increase 4 to 6 percent for alternative insecticides and 7 to 11 percent for alternative nematicides.

Based on estimated risks and the minor benefits, the Agency concluded that the risk outweighs the benefits and proposes to cancel the use of carbofuran on peanuts.

6. Tobacco. Numerous species of birds may be present when carbofuran is applied to tobacco fields. Tobacco fields tend to be small, thereby providing a high ratio of "edge" habitat to field area. Edge habitat would tend to have high levels of bird activity, including nesting, rearing, and foraging.

Extremely high values of LD_{50}s/sq ft have been estimated for songbirds, upland gamebirds, and waterfowl. The range is from 114 to 3159 which represents the highest range of values calculated for all 10 crop sites, with the exception of pineseed orchards.

Use of all carbofuran formulations has been declining in recent years in tobacco. Approximately 20,000 to 40,000 acres are treated each year, or 3 to 6 percent of the crop. A review of efficacy data indicate that effective alternatives are available, including ethoprop and fensulfothion, and yields of those acres normally treated would not be significantly reduced. The flowable carbofuran formulation is the preferred

alternative. This formulation may also pose a hazard to birds, but at this time field study data are not available to evaluate the hazard. These data are being required through the reregistration process.

A change from granular to flowable carbofuran would increase per acre costs by approximately $11 to $20 per acre, which is less than 1 percent of annual variable production costs. A total annual production cost impact ranging from $220,000 to $800,000 is estimated for the current granular carbofuran user. Less than a 1 percent variable production cost increase for 3 to 6 percent of the U.S. tobacco crop may result, but should not affect tobacco prices. Output effects are not expected at the commodity or retail level.

Because of the minor benefits, the Agency concluded that the hazard to birds outweighs the benefits of use and proposes cancellation of granular carbofuran on tobacco.

7. Cotton. Cotton represents less than 1 percent of both the granular and total carbofuran usage. Approximately 30,000 acres are treated (primarily in Texas). Marshbirds and songbirds along with the endangered species, the Mississippi sandhill crane and the Aplomado falcon, may be exposed when carbofuran is applied. The estimated LD_{50}s/sq ft for the three representative bird groups range from 6 to 527. This range suggests that carbofuran's application to cotton sites poses a potential risk to avian species.

Carbofuran is used in cotton for preventive control of thrips. However, this use is controversial because some research indicates that this pest causes damage that reduces

yield, while other research indicates that it does not.

Both at-planting and foliar treatments are available. Cancellation would result in aggregate farm level impacts totaling $120,000, at most. Adverse economic impacts are not expected to occur for either the cotton industry or other interrelated sectors of the economy.

The Agency concluded that the risk outweighs the minor benefits and proposes to cancel the use on this site.

8. Cranberries. Birds are expected to be present at the time that carbofuran is applied to cranberries. Carbofuran poses a very high risk to songbirds, upland gamebirds, and waterfowl as suggested by the Agency's estimated numbers of LD_{50}s/sq ft for this site. The estimated values range from 89 to 1052.

Cranberries represent less than 1 percent of both the granular and total carbofuran usage. Approximately 400 lb ai are applied to 185 acres of nonflooded cranberries in Washington and Oregon. While only carbofuran is registered for use on non-flooded cranberries to control the larval stage of the black vine weevil, acephate is an efficacious insecticide for the control of the adult stage of this pest. Major annual impacts without considering acephate's use are estimated to be $1.0 to $1.1 million ($7.0 to $7.7 million over 7 years).

The Agency has determined that the risks outweigh the benefits, and therefore proposes to cancel this use.

9. Pineseed orchards. A variety of birds including predator species are expected to be present at the time of application. Although no bird kill incidents were reported,

a field study evaluated the effectiveness of specialized application equipment. The Agency concluded that the equipment did result in a high degree of incorporation, but birds mortalities still occurred ranging from 0.4 to 1.4 birds per acre.

The LD_{50}s/sq ft analysis for pineseed orchards resulted in the highest values of all of the crops analyzed. The minimum and maximum LD_{50}s/sq ft ranged from 438 to 10,002 for the three representative bird groups.

Pineseed orchards also represent less than 1 percent of both granular and total carbofuran usage. Only 5 percent or less of the 10,000 acres of mature seed producing pine orchards are treated with 1,500 to 7,500 lb ai. Use on young seed orchards is more important (20 to 50 percent of the acres), although usage is still estimated to be less than 100 lb ai. Aggregate annual economic impacts would be no higher than $11,000 which represents a 2 to 3 percent increase in production costs.

Because of the minor benefits associated with carbofuran's use on this site, the Agency proposes cancellation.

10. Sunflowers. Many types of birds, including waterfowl, game birds, songbirds, and other species are expected to be present when carbofuran is applied to this site. These birds are expected to frequent sunflower fields and border areas for feeding, nesting, cover, brood-rearing, and bedding. Neither field studies nor bird kill incidents were available.

The LD_{50}/sq ft analysis indicated a minimum of 6 and a maximum of 1368 for the three representative bird groups.

All of these are high enough to suggest potential risk to each bird group. Because of the similarity of this site to the other sites, such as corn, the risk is expected to be similar.

Sunflowers account for less than 1 percent of both granular and total carbofuran usage. From 1 to 5 percent or 18,400 to 105,900 U.S. acres are treated with 18,400 to 121,100 lb ai annually. Over the last few years, more cost-effective rescue treatments are replacing the use of at-planting insecticides such as granular carbofuran. No adverse impacts are expected for either sunflower producers or consumers.

Because of the minor benefits, the Agency concluded that high risks, especially as compared to the alternatives, outweigh the benefits of use and proposes cancellation.

11. Other sites. Carbofuran is also registered for use on sites that were not examined with the same degree of intensity. The risk from use on these sites is anticipated to be similar to the risks from use on corn.

Regarding benefits, a review of the potential alternatives for these sites indicated that registered alternatives are not available for the following:

Site --	Pest --
Section 3 registrations -	
Banana	Weevils
Sugarcane stubble	Wireworms (FL only)
24(c) registrations -	
Sugarcane	Sugarcane beetle
Sugarcane stubble	White grubs (TX) Sugarcane beetle (MS)

Sweet corn	Corn stalk weevil (FL)
Alfalfa	Pillbug (IL)
White pine	White pine cone beetle (OH)

The Agency did not receive comments during the PD 1 comment period regarding the benefits of use on these sites. Thus, the Agency assumes the benefits are negligible, although no alternatives are registered, and proposes cancellation.

A review of the potential alternatives of the other crops indicated that alternatives that may be used either at-planting or as foliar treatments are available. Thus, the Agency has determined that the hazard outweighs the minor benefits and proposes cancellation of these remaining minor uses of carbofuran.

F. CONCLUSIONS

The Agency proposes to cancel the registrations of all granular products containing the active ingredient carbofuran. The Agency has evaluated several risk reduction measures and has concluded that the avian hazard of granular carbofuran outweighs the benefits of continued use. The Agency recognizes that while the substantial risks outweigh the substantial benefits associated with the use of carbofuran on rice, additional information pertaining to carbofuran's risks and benefits on this site would be desireable. Additionally, the Agency requests the submission of any efficacy data on carbofuran and its alternatives.

G. PROPOSED REGULATORY ACTIONS

The Agency proposes to cancel all granular products containing carbofuran that are registered for all crops.

IV. PROCEDURAL MATTERS

As required by FIFRA sections 6(b) and 25(d), and 40 CFR 154.31(b), EPA has transmitted copies of a draft Notice of Intent to Cancel based on this Notice, together with the support documents, to the Secretary of Agriculture and the Scientific Advisory Panel for comment. EPA will publish any comments received from the Secretary or the Panel, and EPA's responses, in the Notice of Final Determination.

V. PUBLIC COMMENT OPPORTUNITY

The Agency is providing a 60-day period for the public to comment on this Notice and on the Carbofuran Special Review Document. Comments must be submitted by (insert date 60 days after date of publication in the FEDERAL REGISTER). All comments and information should be submitted in triplicate to the address given in this Notice under ADDRESS. The comments and information should bear the identifying notation OPP-30000/48A. All comments, information, and analyses which come to the attention of EPA may serve as a basis for final determination of regulatory action during the Special Review.

VI. PUBLIC DOCKET

The Agency has established a public docket (OPP-30000/48A) for the Carbofuran Special Review. This public docket will include (1) this Notice; (2) any other notices pertinent to the carbofuran Special Review; (3) non-CBI documents and copies of written comments or other materials submitted to the Agency

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in response to this Notice, and any other documents regarding carbofuran submitted at any time during the Special Review process by any person outside the government; (4) a transcript of all public meetings held by the Agency for the purpose of gathering information on carbofuran; (5) memoranda describing each meeting held during the Special Review process between Agency personnel and any person outside government; and (6) a current index of materials in the public docket.

Dated: 5 Jan 89

Acting Deputy Administrator